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(54) Improvements in or relating to
 hinges

(57) The knuckles (2,2') of hinge leaves
 (1, 1') are bushed by interchangeable
 flanged bushes (20, 22) of low friction
 material through which the hinge pin
 (3) extends. Two of the bushes have
 thick flanges (21) and the other two

have thin flanges (23) to enable the
 relative axial positions of the hinge
 leaves to be adjusted by swapping
 around the bushes. In order to provide
 lateral adjustment of the hinge leaves
 the bores (25) of the bushes are
 eccentric to their external surfaces
 and each bush can be set in its
 associated knuckle in four possible
 angular positions.

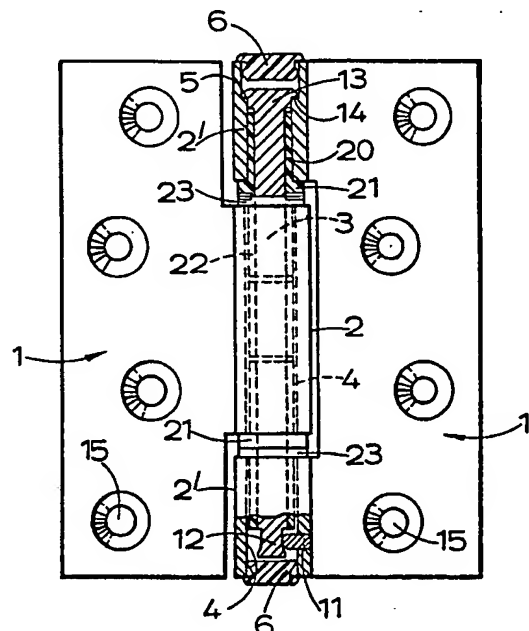


FIG.1.

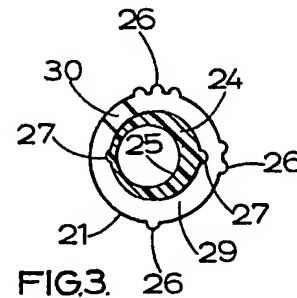
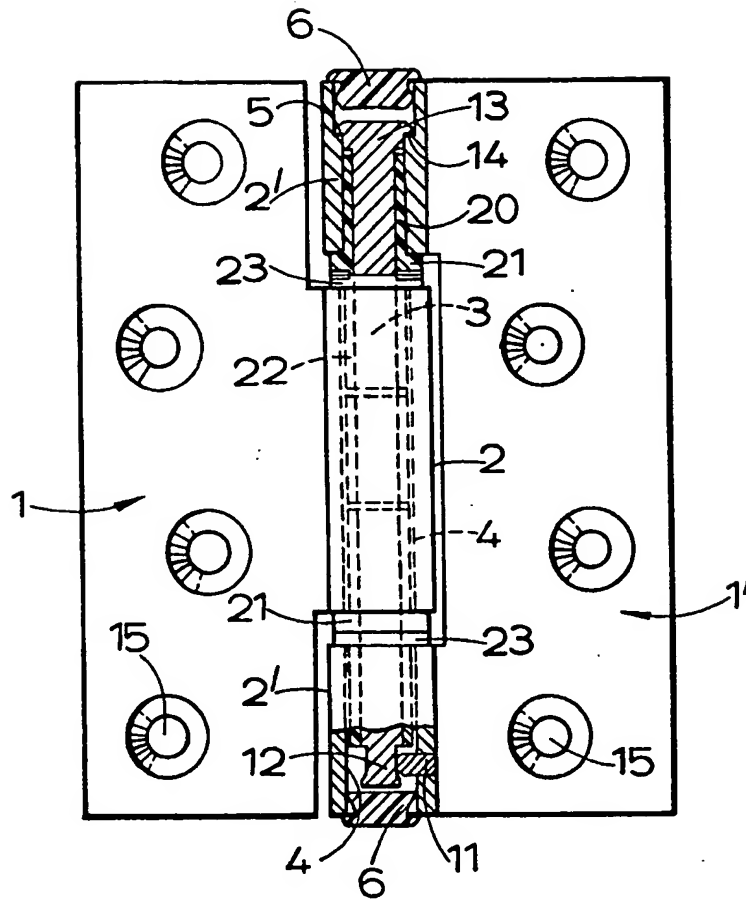
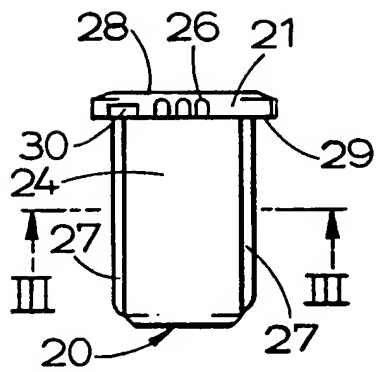
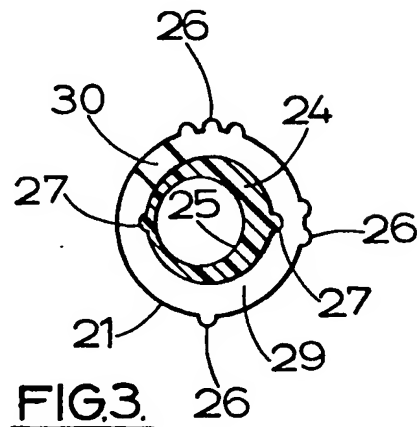


FIG.3.

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The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

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FIG.1.FIG.2FIG.3.

SPECIFICATION

Improvements in or relating to hinges

The invention relates to improvements in or relating to hinges of the kind comprising two leaf members pivotally connected together by a pin extending through bores in knuckles of the leaf members, and flanged bushes located in the knuckle bores to provide a bearing surface for the pin as well as a thrust-bearing surface extending between adjacent faces of two adjacent knuckles. Such a hinge will hereinafter be referred to as a 'hinge of the kind set forth'.

A hinge of this kind is described in our U.K. Patent Specification No. 1 330 499.

The mounting of a hinged member such as a door or window can be a skilled and time-consuming operation if the hinge is provided with no means of adjustment. There is an increasing need for adjustable hinges in situations where suitably skilled labour is often not available for mounting the hinge, such as in the manufacture or fitting on site of pre-fabricated replacement window assemblies. The cost of such assemblies may also be reduced if tolerances can be increased by providing some means of adjustment of the hinges to accommodate variations in dimensions.

It is known to facilitate adjustment of the transverse separation of the leaf members by provision of flanged bushes having an eccentric bore, and which are lockable in appropriate angular positions relative to the leaf members. This does not, however, provide any adjustment in the longitudinal direction of the hinge, by which means, for instance, the accurate vertical location of a door within a frame might be achieved.

According to the invention a hinge of the kind set forth comprises first and second knuckles on one leaf and a third knuckle on the other leaf positioned between the first and second knuckles, the bushes associated with the respective knuckles having flanges of at least two different thicknesses such that interchanging the bushings of different flange thickness provides a variety of positions of said third knuckle relative to said first and second knuckles. In this manner, the relative longitudinal displacement of the leaf members is made adjustable.

In a preferred embodiment, there are provided for ease of use and manufacture bushes having two different thicknesses only of flange giving two equal longitudinal displacements on either side of a mean position in which the leaf members are longitudinally coincident and in which bushes having flanges one of each of the two thicknesses provide the bearing surfaces between each adjacent pair of knuckles, but in other embodiments more than two thicknesses of bush flange may be provided.

The bores of the bushes are preferably eccentric to the external surface of the bush in order to enable adjustment of the relative lateral displacement of the leaf members.

Means is preferably then provided on the outer

surface of each bush flange to indicate its angular position relative to the associated knuckle.

The bush or the knuckle bore wall is preferably provided with at least one longitudinal tongue, for engagement in one or more complementary

longitudinal grooves provided in the knuckle bore wall or bush respectively by means of which the bush is angularly located in the knuckle bore.

The pin may have a portion of reduced diameter which is engaged by a grub screw to lock the pin against movement in an axial direction.

When the knuckles are provided with through-bores, such as when the bores are produced during extrusion of the hinge leaves, the open outer ends of the knuckle bores may be closed by push-fitting inserts.

An embodiment of the invention will now be described with reference to the accompanying drawings, of which

Figure 1 is a plan view of a hinge in accordance with the invention, partly broken away and in cross-section;

Figure 2 is a side view of a bush of the hinge shown in Figure 1; and

Figure 3 is a cross-section on the line III—III of Figure 2.

As shown in Figure 1, a hinge comprises two leaf members 1 and 1'. Leaf 1' is provided with two longitudinally spaced apart knuckles 2' between which is received the single knuckle 2 integral with leaf 1. The leaves 1, 1' are formed by extrusion with suitable machining to define the length of the knuckles. The leaf members 1, 1' are drilled to provide countersunk holes 15 by means of which the hinge may be fixed in place by screws (not shown).

The knuckles 2, 2' each have a bore 4 produced during the extrusion process which receive a bushed hinge pin 3. The pin 3 is anchored at the lower part of the hinge by a grub screw 11 which engages a portion 12 of the pin of reduced diameter. The pin 3 is provided with a head 13 at the opposite end to the reduced diameter portion 12 which has a lower shoulder 14 resting on an annular shoulder 5 formed by a step provided by a machined counterbore to the bore 4 of the uppermost knuckle 2. The outermost ends of the bores 4 are closed by push-in plastics inserts 6.

Bushes 20, 22 are located radially between the pin 3 and the bores 4, the bushes being formed of nylon or other low friction material. The bushes 20, 22 are provided with annular flanges 21, 23 respectively, the flanges 21 being of greater thickness than flanges 23.

Figures 2 and 3 show details of the bushes 20 with the thicker flanges 21, but it will be appreciated that the bushes 22 with thinner flanges 23 are substantially the same except for the thickness of the flanges. Each bush 20 comprises a tubular body portion 24 with the flange 21 extending from one end. Each bush 20, 22 has an eccentric bore 25 with indicators in the form of integral pips 26 provided on its rim which give a visual indication of the angular position of the bush relative to the associated knuckle.

Each bush 20, has two diametrically opposed longitudinal tongues 27 which are received in use in any opposed pair of four equi-angularly spaced complementary grooves (not shown) in the

- 5 knuckle bore walls, thereby to provide four possible angular orientations of each bush. Each of the flanges has a thrust bearing face 28 and an oppositely facing knuckle-engaging face 29 in which is provided a recess 30 facilitating removal of the bush from the knuckle by insertion of a tool. Bushes 22 may be provided with a different number of recesses (for example, four) to aid identification of the different bushes 20, 22.

- The difference in the thicknesses of the flanges 15 21 and 23 enables a choice of relative positions of the leaf members in a longitudinal direction to be made during assembly of the hinge. In the present example of a three knuckle hinge, two knuckle-to-knuckle joints each include the flanges of two 20 bushes which serve to reduce friction at the joints. If each joint includes one thick flange 21 and one thin flange 23 (as shown in Figure 1) the joints are equally thick and the leaf members 1, 1' are longitudinally coincident. If, however, the bushes 25 are rearranged so that thick flanges 21 are included in one joint and thin flanges 23 in the other, the leaf members 1, 1' will be longitudinally offset in a direction depending on the choice of location of the bushes carrying the respective 30 flanges 21, 23. If, for example, the difference in thickness between flanges 21 and 23 is 1 mm, depending on the situation of the respective bushes a relative longitudinal displacement of the leaf members 1, 1' of 1 mm is obtainable in either 35 direction.

- In combination with the choice of lateral displacement of the leaf members 1, 1' conferred by the eccentric bores 25 of the bushes 20, 22, great flexibility in positioning a door, window or 40 gate during hanging is obtained by this longitudinal adjustment.

- The illustrated example shows only two different sizes of flange, but the four bushings 45 could each have flanges of different thicknesses to provide smaller steps of adjustment.

Flanged bushes are shown in the illustrated example in use in a hinge having three knuckles but bushes of this kind could of course be used in hinges having more than three knuckles.

50 CLAIMS

1. A hinge of the kind set forth comprising first and second knuckles on one leaf and a third knuckle on the other leaf positioned between the first and second knuckles, the bushes associated 55 with the respective knuckles having flanges of at least two different thicknesses such that interchanging the bushings of different flange thickness provides a variety of positions of said third knuckle relative to said first and second 60 knuckles.

New claims or amendments to claims filed on 28th April 1983.

Superseded claim: 1.

New or amended claims: 1—5.

- 65 1. A hinge of the kind set forth comprising first and second knuckles on one leaf and a third knuckle on the other leaf positioned between the first and second knuckles, the bushes associated with the respective knuckles having flanges of at 70 least two different thicknesses such that interchanging the bushings of different flange thickness provides a variety of positions of said third knuckle relative to said first and second knuckles.
- 75 2. A hinge as claimed in claim 1 in which the bushes have flanges of only two different thicknesses.
3. A hinge as claimed in claim 1 or claim 2 in which the bore of each bush is eccentric to the 80 external surface of the bush.
4. A hinge as claimed in claim 3 in which the radially outer surface of each bush flange is provided with means to indicate the angular position of the respective bush relative to the 85 associated knuckle.
5. A hinge substantially as described with reference to the accompanying drawings.